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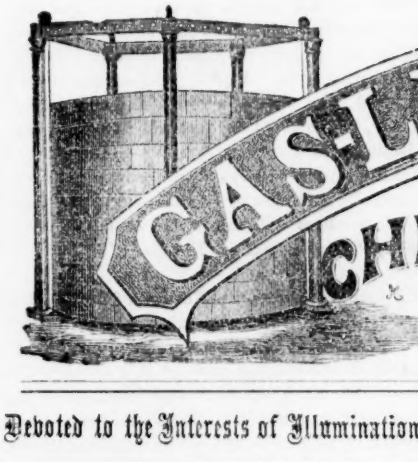
Munzinger's Electric Gas Governor and Pressure Indicator.

The quantity of gas consumed in large cities varies greatly at different times. It is evidently a matter of some importance to the consumer, as well as to the manufacturer of gas, that the supply should be duly adjusted to the consumption, and any contrivance that can accomplish so desirable an object will save a great deal of trouble and much unnecessary waste.

Mr. P. Munzinger, Gas Engineer of the Pascal Iron Works (Messrs. Morris, Tasker & Co.) in Philadelphia, has devised a system whereby the flow of gas from the works into the mains can be regulated and controlled automatically by establishing electrical connections between any point of the gas main and the works where the gas is manufactured

Heretofore the Parisian system for controlling the flow and pressure of gas in street mains has been the most successful. Four three inch supplemental gas mains radiate from the gas works as a common centre and lead to the extreme of the street main extension; the flow and pressure of the gas in these pipes operates on the drum of a diminutive gas holder located at the works, to open or close a supply valve of the street main, according to the degree of pressure in the supplemental main; the cost of the pipes and the subsequent ditching and settling makes the system entirely too expensive for general adoption.

Fig 1



By Mr. Munzinger's system the expensive Parisian supplemental main is avoided, and a more perfect, reliable, and sensitive one is put in practice which is founded on correct principles, and is practically successful for long as well as short distances. The accompanying engravings show the instruments used; they are constructed with as much simplicity as possible, consistent with exactness of working.

Fig. 1 is an electric contact former which is placed at any point of a gas main best suited for maintaining the required degree of pressure. A bell or holder, which, by suitable connections, receives the pressure of the gas in the main, is suspended by a cord A, passing with frictional contact over a grooved pulley B, and is balanced by a weight at the other end of the cord; large gear wheels CC' turn loosely on the pulley shaft, each is provided with a detent D which engages with a ratchet wheel E, keyed on the shaft: the detents and ratchets are reversed on their respective wheels, so that the revolution of the pulley shaft in one direction puts in action one wheel C and idles the other C', and vice versa, when revolving in the opposite way. Parallel with the pulley shaft are counter shafts FF', which carry the small gear wheels GG', for engaging with the large wheels CC', and the tappets HH', which operate the contact formers II', placed oppositely of the machine.

Fig 2

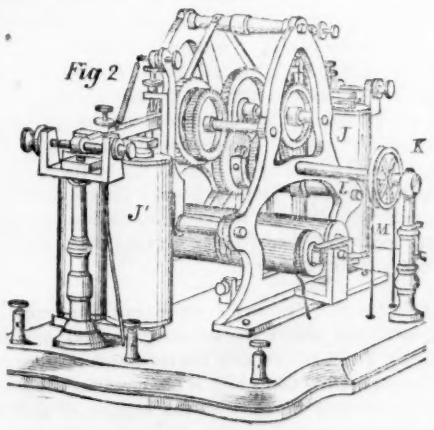


Fig. 2 is an instrument situated within the works, convenient for controlling the flow of the gas from the holder. It consists of two pairs of electro mag nets JJ', with their respective magnets, armatures, armature levers, etc., etc., arranged by means of independent ratchet pawls to operate a pulley K, on the shaft L, in opposite directions, and thus open or close a valve on the end of the weighted cord M.

Suppose two such instruments, properly adjusted for keeping up a uniform pressure, be located, one at any point of the main, and the other at the works, with their electrical connections properly established. If the pressure from the gasometer be unduly increased, the gas-holder of the instrument fig. 1 ascends, the weight on the opposite end of the cord A rotates the pulley B, and sets in motion the wheels C, G, and the tappet wheel H, operating the contact former I, whereby the electric circuit is completed for operating the side of the instrument fig 2, for closing the valve suspended by the cord M, and thus shut off the gas flow until the pressure in the main is unduly decreased, when the gas-holder again descends, bringing into action the wheels C', G', and the contact-former I', completes the electric circuit for opening the valve of the instrument fig. 2, and increasing the gas supply.

It is evident such an arrangement tends to keep the pressure of the gas constantly adequate to the demand. It will effect the regulation in an equal degree when the inequalities of pressure are occasioned either by an increased or diminished supply. The two instruments are synchronous in their movements, and perfectly automatic, and illustrate the ease with which a subtle agent like electricity can be brought to the aid of the gas engineer, and put the most remote parts of the gas main instantly within his control.

Fig.3.

Fig. 3 represents an instrument for indicating the degree of the gas pressure in mains. To that end it is set in a box or pit above the gas main, at a place where the pressure can be noted with a reasonable degree of certainty, and electrically connected with the dial fig. 4, and the key fig. 5 at the engineer's office. It is similar in construction and mode of operation to that illustrated in fig. 2, saving a few minor details for opening and closing the circuit. A gas-holder which is operated by the pressure of gas in the main is suspended by a weighted cord N, over a pulley O, on the end of the shaft of which is a bent contact-former P, placed adjacent to a similar one Q, fixed to the end of the main shaft of the machine. The gas-holder is adjusted to vary from one-tenth of an inch pressure to four inches. The dial plate fig. 4 is divided into forty

Fig. 4.

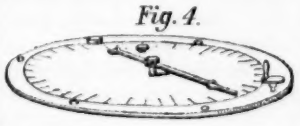


Fig.5

equal divisions, each represents one-tenth of an inch pressure. When the fixed degree of pressure is acting on the gas-holder, the contact-ormer P assumes a vertical position, and is in contact with the contact-former Q; the index of the dial stands at zero. If the pressure of the gas in the main varies, and it is wished to determine its exact condition, the key fig. 5 is put in operation, each pressure of it completes the electric circuit, and advances the index one degree on the dial, and causes the contact-former Q, to advance by a kind of step motion until it contacts with the contact-former P, then the index of the dial will indicate the degree of pressure in the main.

Mr. Munzinger's system is destined to attain a wide popularity. So far it is highly gratifying to report that the most sanguine expectations have been realized. The tests of its efficiency in comparison with other symptoms for regulating the gas pressure in street mains, show it to be deserving of universal adoption.

British Patent—Machine Stoking.

W. Foulis, Glasgow, "Improvements in charging and drawing retorts, and in the machinery or apparatus employed therefor." Patent dated Jan. 6, 1873. This apparatus consists essentially of one, two, or more hydraulic cylinders connected together by telescopic joints, and situated horizontally. These hydraulic cylinders or tubes are mounted upon a platform or carriage, which traverses on wheels a line of rails situated parallel with the charging ends of the retorts. The outer hydraulic cylinder or tube carries a "scoop" or "scoops" (or other similar appliance) in which the charge for the retort is placed.

In charging a retort the hydraulic apparatus is connected to a water-pressure main or pump, and the water under pressure being admitted to the hydraulic cylinders or tubes opens them up telescopically, so that the scoop with the charge is advanced into the retort. When the scoop is thus situated it is rotated on its axis, so as to deposit the charge, by means of a short hydraulic cylinder, a rack and pinion, or the mechanical equivalent of either of these acting upon the cylinders or tubes, so as to rotate one or more of them together with the scoop. When the charge is thus deposited in the retort the scoop is withdrawn. This may be effected either by causing the water to act upon the tubes in the reverse of that before mentioned, or chains, racks, and pinions, or other apparatus commonly used for drawing back hydraulic rams, may be adopted. The apparatus is so mounted on its carriage that it may be raised or lowered to correspond with any position of the retorts.

The apparatus for drawing the retorts also consist of one or more hydraulic cylinders or tubes mounted in the manner described with reference to the charging apparatus, but in place of the scoop or scoops a coke-drawing "rake" or "rakes," or their equivalent, is fixed thereto, and the hydraulic pressure is applied so as to pull the coke out of the retorts. It is obvious that the same apparatus which is used for charging may also be used for drawing retorts by employing either the charging-scoops or drawing-rakes as required. It will, however, generally be more convenient to have separate apparatus for each operation.

The apparatus instead of being actuated by water under pressure may be operated by compressed air or steam or other fluids or liquids, and any number or sets of the apparatus may be mounted on one traversing platform or carriage.

In charging the scoop the coal may be shovelled or tipped into it, or a long hopper, having a bottom capable of being opened at any time, may be brought over the scoop and the charge dropped into it.—*London Journal of Gas-Lighting.*

A Great Gas Well.—The latest wonder is the discovery of a great gas well near Fairview, Pa., which throws out a stream of gas with such force that a stone weighing one hundred pounds, placed over the top of the hole is thrown fifty feet in the air.

Chemical Repertory.

No. 101.—October 16, 1873.

EDITOR—HENRY WURTZ.

CHEMICAL EXCERPTS.

876. New Oil-Stratum.—About the middle of last month, the following item went the rounds. Too much of a good thing we fear.

Titusville, Pa., Sept. 18.—Intense excitement prevails in the oil regions over the discovery in the lower district of a fourth sand rock, which promises to be more prolific in the production of petroleum, than either of the formerly producing strata of the second and third.

877. Purple of the Ancients.—This coloring matter, found in the urn and supposed to have come from the vestments in which St. Ambrose was buried in the ninth century, which Frapolli had supposed to be a mixture of indigo and lac, Bizio regards as probably Tyrian purple, obtained from *murex trunculus* or *murex brandaris*. He gives in parallel columns the chemical properties of this ancient purple, as compared with indigo.—*Amer. Artisan.*

878. Fashion and Fire.—Only a few days ago Mrs. Archer Clive—the gifted author of "Paul Ferroll"—perished by fire, and now another lady has died in the same frightful manner. It seems strange that none of the devices for making ladies' clothing incombustible have come into general use. About a year ago an incombustible starch was much talked of, was severely tested by scientific experts, was generally approved, and has never been heard of since. It is too bad that ladies should die an agonizing death when means exist for rendering these deplorable accidents absolutely impossible.—*Iron.*

879. Defecation of Drinking Water—Worth Testing.—Professor Gustav Bischof, of Glasgow, has improved on his invention and filters water through spongy iron and pounded limestone. The iron is placed in the upper movable chamber of an earthenware filter, and powdered limestone is arranged in a separate layer below. The iron is procured in a powdery spongy state by the reduction of an ore without fusion, after the extraction of sulphur and copper by heat. It removes all allumenoid and nitrogenised compounds, and also lead contaminations, from the water; and a trace of iron taken up by the water is separated by its subsequent passage through the limestone. One charge of the material, costing one shilling, secures efficient filtering for ten gallons of water per day during 200 days.

880. On the Statistics of Saline Solutions.—M. Berthelot makes the following general proposition: "The salt, of which the formation disengages the most heat, is that which is produced in solutions, every time that the salts, at the expense of which it can be formed, are in a state of partial decomposition in the liquid." From the examples which he cites, "there follows," says the author, "a general rule applicable to saline solutions; new verifications are furnished for a principle of thermo-chemistry, which he announced a few years ago, and which leads to the following consequence: "Every chemical change which is accomplished without the intervention of external agencies tends towards the production of that body or system of bodies which disengages the most heat."—*American Artisan.*

881. Glut of Diamonds.—English papers report that the market for diamonds continues in a very depressed state owing to the abundance of the supply, and, with the exception of stones of very large size, brilliants, and small rose diamonds of the very finest quality, the fall in value has been general, and in some descriptions, such as rose-cut diamonds of mediocre to middling quality, equal to from 30 to 40 per cent.—*Eng. and Min. Journal.*

882. "Coals to Newcastle."—The *Pittsburgh Commercial* says: "The trouble between the miners and operators is bearing fruit. The price of our own ceal has been advanced to such a figure that anthracite can be shipped here and sold at less cost (considering its heat-giving properties), than the bituminous from our own hills. A great deal of hard coal has been used here, by the wealthy, not as a matter of economy, but to avoid the dust and soot. A prominent banker, who has been figuring on the price, has laid in his winter supply of anthracite, and says he will actually save money by the operation. Doubtless many others will follow his example. This is certainly 'carrying coals to Newcastle.'"

883. Our Association.—We learn from Professor Henry Wurtz, of New York, editor of the *American Gas-Light Journal*, of the formation of a national association of the gas fraternity of this country. The name of this body will be "The Gas-Light Association of the United States." The want of such a union of the talent engaged in the gas manufacture throughout the country, in order to further this important industry in its commercial and scientific relations, has long been felt: but until this last movement which inaugurated it, all efforts in that direction have been unsuccessful. It will doubtless prove exceedingly beneficial, as have those established in foreign countries. The officers of the new association are: Chas. Roome, President; P. E. Demill, W. H. Price, and Thomas R. Brown, vice-presidents; Prof. Henry Wurtz, secretary; and J. W. Smith, treasurer.—*Dr. Wahl, in Amer. Exchange and Review.*

884. "Extra-Hazardous."—In the great balloon ascent of Coxwell and Glaisher, in 1862, the enormous height of 37,000 feet above the sea level was attained. At 29,000 feet Mr. Glaisher fainted and did not revive until the balloon had descended and returned to the same point. At 37,000 feet the barometer stood at 7 inches, and the thermometer at 12° below zero. Coxwell became almost paralyzed, and only saved the life of himself and his fellow aeronaut by seizing the valve rope with his teeth, and thus allowing the gas to escape. If, by extreme fortitude, one man has managed to live at two miles above the fainting level of another, could human beings generally exist in an atmosphere reduced to five sevenths the density.

885. Gas from Pine Leaves.—Pine leaves are largely utilized in Europe. They are converted into a kind of wool or wadding, which is used for upholstery instead of hair. A kind of flannel is also made from this fiber, which is said to be very superior for many hygienic uses, as for rheumatism and skin diseases. Vests, drawers, loose shirts, etc., are alao made. In the process of manufacture an etherial oil is also obtained, very useful as a solvent, and as a curative agent. Gas is also made from the refuse and used for lighting the manufactories; or the entire refuse may be pressed into the form of bricks, when it becomes a most excellent substitute for coal.—*Mining and Scientific Press.*

886. Parisian Gas.—Accepting statements made as true, the Paris gas company, though a monopoly, gives to that city the best light in the world. Its supply is furnished through more than a thousand miles of pipe, and the company pays to the city $40,060, annually for the right. It bears the cost of repairs whenever pipes have to be relaid, pays more than $500,000 annually for taxes, and nearly three times as much as the city's share of its profits, besides the pay of 750 lamplighters, who light and extinguish the lamps over a space of 950 miles in 40 minutes.

886. Gilding Iron.—[The following item has been going the rounds. The writer of this note thinks it well therefore to say that he himself patented, in England and this country both, some eight or nine years since, the use of sodium amalgam in gilding iron, by a number of methods, substantially including the one here set forth.—H. Wurtz.]

Sodium amalgam is first applied to the iron, which is hereby readily coated with mercury. Next a concentrated solution of chloride of gold is applied to the mercurially coated surface; and lastly, the object is strongly heated, either in a muffle or in the flame of an enameller's lamp.

888. Gas Music.—The appearance of the new instrument, the pyrophone, invented by M. Frederick Kastner, which has a part in the score of M. Gonnod's new musical drama, "Jeanne d'Arc," at the Paris Gaiete, is expected with some interest. The instrument emits its sound by means of lighted gas circulating in glass tubes; the sounds, it is said, resembling simultaneously the human voice and an Æolian harp. The inventor of the new instrument was untrammelled by precedent, at all events,—*Figaro.* [Our readers will remember that Mr. Goddard, jun., of Ipswich, exhibited at the *soiree* of the Ipswich Science Gossip Society, in December last, an instrument of this kind he had invented, and which was called a "musical flame organ." See *Journal of Gas Lighting*, December 31, 1872.]

889. Water-Works of Paris.—Paris now receives water from the rivers Seine, Ourcq, and Marne, which furnish a daily supply of 281,500 cubic metres, (74,500,000 gallons), and from the sources of Arcueil and Dhuis, together with the artesian wells of Grenelle and Passy, which yield 33,600 square metres (9,000,006 gallons) per day. To this must be added what is obtained from the Northern springs, which, at the least, perspire (that is the right term) 216 cubic meters (57,000 gallons) per day. Thus 315,316,000 litres (83,500,000 gallons) of water are furnished daily to the Parisian population, which can with all comfort use it for drinking, bathing, domestic uses, cleansing culverts, and supplying engines and fountains.

890. Optics Applied to Rat Catching.—A man in Pennsylvania has invented a rat trap that is made to operate upon the selfish passions of the poor rat, and lure him into trouble. A mirror is set in the back part of the device, beyond the bait, and as his ratship is out on a foraging expedition, he espies the bait; at the same time believes his own image in the mirror to be another rat making for it on the opposite side. This is too much for rat nature to stand and be cool over, so he rushes for the bait, and is caught.—*Amer. Artisan.*

891. English Gas-Patent.—W. Richards, Burton Road, Brixton, Surrey.—Improvements in machinery and apparatus for charging and drawing retorts used in the manufacture of gas.—This consists in the erection of a quadrilateral frame upon a platform mounted on wheels, suitable for running along a tramway in front of the retorts, and provided with boiler and engine for giving motion to the scoops, rakes, and other parts of the machine. The essential features are the construction of a platform or platforms in combination with the machine for transporting and storing coals for charging. The employment of a chain, rope, or band passing round horizontal pullies, and attached to each scoop for the purpose of propelling it into the retort and withdrawing it therefrom. The formation at the back end of the scoop, a lever groove and short quick screw or its equivalent, working into a corresponding boss, whereby the scoop is reversed when it has entered the retort to a proper distance, and again righted on withdrawal. The application of the motion known as the "lazy tongs" to the rake for discharging the retorts. The arrangement of the stages upon which both scoops and rakes may rest, together with the contrivance for raising or lowering the stages to the required elevation by means of quick-threaded screws, with corresponding screw bosses, and having suitable reversing gear.

892. Cork Jackets for Steam Boilers.—M. Chevallier, a French engineer, has adopted cork for the jacketing of boilers and other parts of machinery. Cork is known to be an excellent non-conductor of heat, and these cork jackets are said to diminish the outward radiation by 150° C. The cork is cut in the form of staves, and these are united together by tongues, as in the case of flooring boards, so that the lines of junction are protected, while the cork staves are easily removed, when the necessity occurs. Portions of one of these jackets, which had been on a boiler at work for fifteen months, were exhibited the other day at a meeting of the Paris Society for the Encouragement of the Arts, etc., and were not found to have been in any way affected by the heat of the boiler.—*Scientific Press.*

893. Anthon's Sewer-Gas Trap.—This invention consists of a box, preferably cylindrical in form, and open at the top. Into the bottom of this box, the pipe leading to the sewer is inserted, which pipe extends up to some distance above the bottom. Into the side of the box, the waste pipe from the basin, tub, or sink is led, having its open end at a lower level than the upper end of the sewer-pipe. The sewer-pipe may enter at the side of the box as well as at the bottom, always provided that its open end is higher than the open end of the waste pipe. Upon the top of the box is fitted a closely fitting cover, which is used to exclude the gases and prevent overflow through the waste-pipe, in case the sewer pipe becomes partially closed. The cover is held by a bayonet joint to the body of the trap. The cover has an outer flange extending nearly to the bottom of the trap. The inner flange has an annular bottom. The fluid from the waste pipe, rising around and above the bottom edge of the inner flange of the cover, effectually seals the trap, so that no gases can escape, except by forcing off the cover. It will be seen that it is impossible for this trap to syphon out—as it is called—a difficulty with the old style of sewer-gas traps, which, when it occurs, leaves no obstacle to the escape of sewer gas into the house.—*Scien. Amer.*

Gas Engines at Vienna.

The Lenoir gas engine is exhibited in the French section, where it drives one of Gramme's magneto-electric machines, the recent invention of which has awakened so much interest among electricians. The Lenoir engine has now been in use many years, and evidently finds many purchasers. It is an engine in which the gas is first introduced into the cylinder, where it meets, and mingles with, the required amount of air, and, when the proper quantity has entered, the mixture is fired, impelling the piston by its expansion, which follows the explosion. As the piston must move a considerable distance before the full charge has entered the cylinder, that portion of the stroke is made without doing work. The explosion of the gas also gives rise, momentarily, to an extremely high pressure, which rapidly diminishes as the piston moves forward, and as the products of explosion, steam, carbonic acid, and nitrogen, condense and cool down. It follows, therefore, that the mean pressure obtained in the working cylinder is comparatively low, while the working parts of the machine must be built to withstand safely an extremely high pressure. The losses of pressure from condensation of steam and from the cooling of the gaseous products of combustion probably become much smaller at high than at low piston speeds, but are undoubtedly serious at all ordinary velocities.

There are many places, however, in which the gas engine is to be preferred to its more economical but less suitable competitor, the steam engine: and with the general introduction of illuminating gas in all cities, it has found quite a large market.

The consumption of gas given by these exhibitors for the best performance of their engines, I have been unable to learn, but early experiments made by that well-known authority, M. Tresca, of the *Conservatoire des Arts et Metiers*—who is here, by the way, as a member of the International Jury, group XIII—indicated the consumption, in small machines, of over 90 cubic feet per horse power per hour. Later experiments upon the Hugon gas engine, and with larger sizes, have given something over 70 cubic feet per hour per horse power. No Hugon engines are exhibited here. The principal difference between the two, lies in the manner of igniting the charge, the one using the electric spark obtained from a small battery and the *inductorium* or Ruhmkorff induction coil, while the other uses a gas jet, ingeniously fitted to a little slide, which carries it into the cylinder to ignite the charge at the proper moment, and brings it out again to be relighted at a fixed jet after it has been extinguished by the explosion.

The only competitor of the Lenoir engine here is found in the German section. This is the gas engine of Otto and Langen. In this engine, the gas is fired explosively, as in the Lenoir, and the contrivance for igniting it is substantially that of Hugon; but the piston is not secured to a crank through the intervention of a connecting rod, as in ordinary engines, but rises freely under the impulsion of the exploding gases, and, when at its greatest height, is caught, and, falling slowly, its weight turns the shaft. It has the movement, in fact, of the Cornish engine—the same rapid rise and the same slow descent of its piston, and is, of course, single acting. An engineer would hardly be likely to propose an application of the Cornish engine to driving mills and ordinary machinery. Its inequality of movement, and its large bulk for comparatively small power, would be serious objections, even if the first were not fatal in all cases. Nevertheless, the builders of this gas engine exhibit an engine numbered one thousand, and claim to have manufactured considerably over that number. Their success in introducing what seems so extremely impracticable a method of obtaining, satisfactorily, a motive power from the combustion of gas, is probably due to the exceptional economy of gas consumption which they have attained. They claim to have obtained the dynamometrical horse power upon a consumption of but one cubic metre of gas—less than forty cubic feet, or about one-half that reported for the older gas-engines—per hour. On one occasion, the trial of one of the larger sizes of this engine is reported to have given even a better result, bringing the figure down to about 36 cubic feet.

The source of this economy must be found, principally, and possibly wholly, in the rapidity with which it makes its upward stroke. The gases have too little time to condense or to fall in temperature seriously. This economy is probably so marked an advantage as to secure the success of this engine, where competing with those previously invented, in spite of the objections noticed. The first impression produced upon the mind of an experienced engineer by its noisy and irregular movement, and by the odor of gas which surrounds it, is, probably, almost invariably quite unfavorable; but it is here doing its work well, apparently, and its economy seems well proven, not only by the certified tests, but by its success in the market.

It cannot be doubted, however, that there is still room for important improvements in this class of prime movers, and we may anticipate that they will be effected before the lapse of a great length of time.

The Brayton gas engine is entered upon the catalogue of the United States section, but it has not made its appearance yet. As the juries have now finished their work, this engine will probably not be examined by a body which has among its members several of the most distinguished engineers and mechanicians of Europe, or of the world. It is a great opportunity lost.—*Sci. Am.*

Curiosities of Coal.

By James A. Whitney, M. E.

Since Lord Dudley's experiments with pit coal in iron manufacture, the mining, preparation and use of this fuel has been the promoting cause of a heavy percentage of English inventions. Recently, some investigations, necessary from an expert's standpoint, brought to my notice a number of curious examples among the earlier alleged improvements, and some of these I purpose to embody in the present writing. I will speak here only of bituminous coal, but other forms, anthracite, lignite, etc., have secured equal attention, have provoked quite as many plans of alleged novelty and usefulness, and have cost to the full as much outlay as the other.

Going back to the (in the arts) remote date of 1824, we find that on February 28th of that year, one Thos. Harper patented one of the earlier methods of avoiding the celebrated smoke nuisance, which arose from the difficulty of wholly consuming the minute particles of bituminous coal, and which was finally put down by act of Parliamennt. He proposed, "for the general purposes of fuel," to mechanically mingle ordinary bituminous coal with stone coal, culm or anthracite, presumably to diminish the proportion of smoke evolved to the point at which the whole could be burned up by the flame, rendered brighter by the non-smoking material. The proportion of bituminous coal was, however, rather too small to render the method of much avail where the soft coal was plenty and cheap, and the stone or anthracite more costly, the percentage of bituminous being from one-twelfth to one-fifth of the whole. It was specifically set forth that "the stone coal may be either employed in the usual form or mixed with the small or culm thereof, about one-half of each, such proportions varying according to the draft or windage" of the furnace.

Fourteen years later, one Thomas Joyce conceived the happy idea of arranging a reservoir within a stove in such a way that as fast as the fuel in the forepart burned away, a fresh supply came down from the reservoir. As English patents have been sometimes granted on inventions previously known, it is possible that that plan had an earlier inception, but so far as I know this was the first example of a type of cylinder stove now in almost universal use and favor in this country. The abridged specification of the patent, dated May fifth, 1838, describes the improvement in this wise:

"Certain improved modes of applying prepared fuel to the purposes of generating steam and evaporating fluids. The fuel to be used in these furnaces may be coke, or wood, coal, charcoal or other fuel prepared, chopped or broken into small pieces so as to insure its falling down the fuel chamber, as the lower part of the fuel is consumed. The combustion chamber consists of a vertical chamber with a grate and apertures, to support combustion at the bottom. It is filled with fuel which only burns at the lower part, the upper part falling down as the lower burns away, the flame and smoke pass out through side passages surrounded by water in the boilers."

The above affords an example of how a device thought of for one purpose may find its general use in another, for the steam boiler made as just specified is nowhere to be seen, while the salient feature of the invention is nowadays embodied in the stoves that heat our parlors. A parallel case is found in the invention of one Robert Walker, patented Dec., 1844, for riddling coals. This comprised a cylinder of longitudinal bars, with interspaces of suitable width. This cylinder being placed in a inclined position, and the broken coal being fed in at the upper end, the smallest pieces fell through the spaces, while the larger passed on to the lower end and fell out on a heap. This is the system of riddling now used abroad for assorting the broken stone from a Blake stone breaker. Walker provided friction wheels, upon which rested the peripheries of the cylinder ends—a method of relieving the axial shaft that might in some cases be advantageously applied to the cylinders used in the treatment of paper stock with alkalies.

While on the subject of coal riddling I may mention the project of Charles Cowper, whose patent bears date November 2, 1849. An endless system of buckets lifted the coal and threw it upon an inclined system of perforated plates. The larger fragments passed on and finally off; but the finer falling through the holes in the plates, fell upon a rocking sifter, up through which water was intermittently forced to carry off the stones, the specific gravity of the latter being different from that of the coal.

The same patent—for an English patent may be made to include a pretty comprehensive subject matter—sets forth a mode of compacting the finer portions for use as fuel by means of tar. The culm and tar are to be placed in a pug mill and thoroughly mixed together. The mass during this operation was to be kept hot by hot air passed into the hollow axial shaft of the mill, and also into a jacket surrounding the latter.

It is difficult to speak of many departments of arts and industry without bringing in the name of Henry Bessemer before the article is completed. It is so in the present instance, and the prominent points of one of Bessemer's patents, granted in 1849, is worthy of mention with reference to the matter in hand. This comprised—I quote the abridged specification:

"Heating small coal so as to soften the same, and pressing it into molds so as to solidify and press it into solid blocks, by letting it fall from a hopper with a regulating roller into a flue through which the heat from a furnace passes."

The material was to be carried through the flue on a system of iron plates linked together to form an endless apron, and supported and operated by suitable drums or rollers. A piston finally forced the mass in portions through an orifice, and separated it into blocks of size suitable for use as fuel. His description also explained the use of different kinds of coal in combination to form a fuel of any desired character; also the elimination of a portion of the volatile constituents of the coal before the treatment mentioned; also, the employment of steam to soften the material; also, the use of a partial vacuum in the elimination of any desired portion of the volatile matter by distillation. He also claimed avoiding the formation of smoke in furnaces by causing the coal to move with a regular motion from front to back of the fire-box. But the apparatus devised for the purpose appears to have been clumsy in the extreme, consisting of wheels lapping into each other in such manner as to present a closed surface for the support of the coal—a mechanism that would warp and twist out of all shape from the effects of the high heat in a very little while.—*Iron Age.*

New Process of Condensation of Liquefiable Matters Held in Suspension in Coal-Gas.

By MM. PELOUZE and AUDOUIN.*

It is a fact well-known to gas manufacturers, that the gas which carries with it from the retorts a quantity of liquid matters (ammoniacal water, tar, etc.) amounting to about 12 kilogs. per cent. of the coal distilled, deposits only a fraction of this in the hydraulic main (4 kilogs. to 4·5 kilogs.), though the temperature of this apparatus is much below the boiling-point of water, and still further below that of the tar products, which is over 300°. It is probable that these liquid particles, which resist cooling, are in a state of fine globular powder, the tenuity of which explain their suspension.

They can only be eliminated through long-continued repose, during which, brought into contact with each other by the internal motion of the gas, they combine to form globules of a larger size, which encounter less resistance from the gas, and gradually fall to the bottom; or by a process which, renewing artificially the contact of the globules with parts already liquefied, facilitates their agglomeration.

This result has hitherto been attained in practice, through a complex and costly apparatus, consisting of collecting mains, coke columns, etc.; yet somewhat imperfectly, and the first vessels charged with matters for chemical purification of the gas are often, spite of such apparatus, abundantly impregnated with tar and ammoniacal water which have escaped condensation.

The new method of condensation which we propose, and which has been successfully applied, is founded on the principle that the liquefaction of globules held in suspension in gas is obtained through the contact of these particles with solid surfaces, or by their mutual contact.

We effect this in the following way:

The gas to be purified passes through a series of apertures in the form of jets, which spread out on a surface placed opposite. This combination produces the contact of molecules with each other in their passage through these tubes; the action is completed by contact with the solid surface, down which the tarry matter streams.

Very high pressure is not necessary. One of less than 0.02m. of water (which is lower than that given by the exhausters) will generally suffice.

The apparatus may be placed either before the exhausters—and in this case a slight vacuum is maintained—or after them. The temperature of the gas, not being high—about fifty degrees in the collecting mains—will not have any hurtful influence on the action of these machines.

The number of apertures in the escape-apparatus, will be determined according to the quantity of gas produced in the works. This result may be readily obtained by means of a special regulator, put in motion by the pressure of the gas.

The apertures may be made either on the surface of pipes, or in plates, according to the form of apparatus adopted. The substance employed may be iron, steel, terra-cotta, wood, or other ordinary material. The disposition of details varies with local convenience.

By these means it is possible to obtain the condensation of certain products, especially ammonia, sulphuretted hydrogen, and sulphide of carbon, which have only been condensed hitherto by methods at once complicated and detrimental to the light-giving properties of the gas (washing with condensation water, etc.). Further, it economises the consumption of purifying substances, while furnishing a considerable quantity of rich tar and water charged with ammonia. The following experiment gives some idea of the results attainable:

We operated with a quantity of tar containing gas from the hydraulic main of a small experimental retort; it was passed successively into two vessels of one litre, one of two litres, a large one of eight litres, and through a column of 0·7m. length, and 0·6m. diameter, without being entirely deprived of tarry matters. On the other hand, we obtained a perfect condensation by making the impure gas pass through our apparatus, having only one escape-hole 0·0016m. diameter, and placed in two small vessels of only 50 grammes contents.

Where it might be found advantageous to have a second washing (with certain liquids—pure water, ammoniacal water, etc.), the liquid in question could be introduced into the apparatus.

We obtain in this manner a much more energetic action than that realised by washing in columns of coke (*iembbers*). The action taking place without any contact of ammoniacal water with external air, there is no occasion to fear the loss of the luminous properties which results from the use of liquids which charge the luminous principles held in solution (hydrogen-carburet) with air, whose action is so hurtful to the light-giving power.

We have found that in making use of finely-divided masses—calcined coke from the retorts—it was necessary to employ vessels of a capacity relatively very great to obtain the condensation of the tarry matters. One does not get a better result by "bubbling" (*barbotage*) the gas, as in that case a great number of successive passages is necessary, and the apparatus has to be pretty large, and the pressure used is considerable.

The apparatus, as used in a Paris factory, which attains to the daily production of more than 100,000 cubic metres of gas, has given excellent results. The gas, after having traversed the apparatus, the capacity of which is not so much as one cubic metre (0·88m. by 0·40m.), is entirely freed from products which destroy the action of the depurative matters; and there is obtained, along with a quantity of tar greater by one-fortieth than that from the distillation of coal, a large quantity of ammoniacal water, of a richness double that of the waters of condensation of gas.

We may add, that numerous photometric tests have proved that the gas has not lost any of its luminous properties. Besides the applications above indicated, it can be applied to the elimination of dust and smoke carried off by gas or vapors.—*Iron.*

[We would give MM. Pelouze and Audouin to know that we outside barbarians are far ahead of them with the above invention. Our readers will remember the "Dry Scrubber" of St. John and Rockwell, described by us, with cuts, May 2d, 1871, in which the principle of the above was fully and clearly explained, and ingeniously applied in practice.—ED.]

* Abstract of a recent paper to the French Academy.

At an Oakland, Ohio, hotel recently, a strong smell of gas was discovered issuing from the room of a bridal party from the country. Admission being demanded to put out the gas, the rural swain replied that "he blew it out, and then the darned thing smelt so bad that he put his stocking over it." Sure enough there was the stocking drawn over the burner and tied down with a shoestring. Ohio is ahead "on the gas," by a stocking full.

Correspondence.

[Correspondents, in all cases, should sign their communications with their names and address in full—not necessarily for publication, but as a guarantee of good faith.—Ed.

Mr. Smedberg's Book.

Memphis, Tenn., Sept. 27, 1873.

Mr. Editor: A short time since you published a list of subscribers to "Smedberg's Synopsis of British Gas-Lighting," which *astonished* me very much; because I missed the name of about nine out of ten of the gas companies of America! Is it possible that any man in the business can give his consent to do without this important publication—the most important ever offered to the guild, here or elsewhere. I regard Mr. Smedberg as the head of the profession in this country, both scientifically and practically; and therefore anything from him will be valuable. His experience is large, and his learning extensive and accurate, which ought surely to qualify him to edit the important work he has undertaken. Think of all the gems which have appeared during the past years in the British *Journal of Gas Lighting*, collected in a single compact volume, and then say you would be without it. Send forward your names and encourage so meritorious a publication, and at the same time get for yourself a work worth a dozen times more than the price.

There may be those who are able to absorb all the information they require, and therefore do not need books. Unfortunately I am not one of that kind. If a man in Glasgow finds a new and efficacious way to stop leaks in main pipes, I am eager to know it at once; and so if Mr. Somerville, of Dublin, has a better system of purification than mine, I wish to know that also. George W. Gift.

Office of N. O. Gas-Light Company,
No. 159 Common Street, N. O.,
October 4, 1873.

Mr. Editor: I have received from Mr. Smedberg a sample copy of the title page and table of contents of the forthcoming "Synopsis of Gas Lighting," with a proof of one of the illustrations. If these are fair specimens of the whole work, there will be nothing left to be desired in regard to typographical excellence. The table of contents seems almost exhaustive in its scope.

Mr. Smedberg writes that he will lose from $2000 to $3000 by the publication. It seems strange in this great country, where every village has its gas works, that a publication of this nature, indispensable to a gas manager, should go begging for subscribers for years, leaving its projector under suspicion, because of the delay. Rouse up your apathetic readers, and tell them that we are all waiting for their subscriptions, so that we may get the "Synopsis" before we die. Yours truly,

Theobald Forstall, Gen'l Sup't.

Gas Tar as Fuel.

Buffalo, October 2, 1873.

Mr. Editor: In your issue of September 16, there appears an article on the subject of gas tar as fuel, by Mr. Nettleton. Being interested in that subject myself, I desire fully to endorse Mr. Nettleton's views as to the economy and advantage of using gas tar as a fuel, where the demand for it for other purposes is not good.

I know nothing of Mr. Nettleton's mode of using or employing it, but I have a mode of employing it, and am now completing the appliances for its use at the works of the Buffalo Gas-Light Company for six double benches, twelve fives. Two fives have been in successful operation for the past twelve months. As to its economy its advantages cannot be fully determined here, as the gas from all the other benches flows into the same main; but the heats are very uniform, and as high as desired, and much higher than those heated by coke, and might be charged every four hours, and when other benches are put in in this manner, they will be so charged. I send herewith a circular, which in part explains my invention.

Yours respectfully,
Ananias Smith.
333 Niagara Street, Buffalo, N. Y.

Scarcity of Gas-Coal in Europe.

The Berlin *Borsenblatt*, of June 27th, contains the following remarks, which seem to deserve notice:

"The growing scarcity of gas coal in Europe calls forth a great deal of complaint in the public prints. Europe has now scarcely enough for its own consumption, and the gas works of Spanish America, of the Brazils, and the British and Dutch colonies on the Pacific will henceforth have to look to the United States, especially to Pennsylvania and West Virginia, for a supply, except in cases where they have contracted in England years ahead."

Similar remarks come from the Ruhr country in Western Prussia, where gas coal is produced; from Belgium, and from France. The *Moniteur Le Commerce*, *La Note Libre*, and the *Messager de Paris*, all papers that may be called standard on coal and metal matters, are teeming with articles to the same import.

To us in the United States, the subject of a growing scarcity of gas coal which seems to alarm so much the people on the Continent, is of the utmost importance inasmuch as we are likely to soon monopolize the near-by markets, both on the Atlantic and Pacific, lending increased activity to our already extensive relations with those of higher values to the lands of those companies countries. It will also lend a higher value to the lands of those companies or individuals that may be fortunate enough to possess good gas-coal deposits, however distant they may be from tide-water: for while the foreign demands will take off the coal nearest the sea, from Philadelphia, Baltimore and Norfolk, our great inland consumption will absorb the stores that are most handy further West. Not to speak of the countries on the Pacific, where neither in China, nor in Japan, nor in the Island of Formosa, nor in Australia or New Zealand, has gas coal been discovered, the field nearest at hand, Spanish America and the Brazils, is of vast importanee to us already.

The sudden rise in the value of certain products, especially coffee, hides, and copper, has during the past two years enriched all South and Central America; and the people are launching out in local improvements and luxury only equalled by lavishness of the Cuban planters ere the present insurrection broke out. Municipal and private improvements, such as we possess in our third class cities, are becoming the order of the day in Spanish America and the Brazils. The people have the money, and they mean to spend it in private residences within the cities of those countries which mostly originate from the times of the old viceroyalties. They are tall, majestic piles of masonry, built on a liberal plan, with the Moorish *patio*, or courtyard, uncovered, in the middle, and to light the vast apartments a great deal more gas is consumed than in American private residences on a like scale. Their streets and public squares are on the same spacious plan, and so are the theatres. Hence the consumption of gas *per capita* in a Spanish American city of the first or second rank is about three times what it is in an American city of the same size—the more so as social intercourse is a great deal more animated after sunset in those warm latitudes than it is the year through in the generality of our States. This will suffice to show the importance of the new customers we shall have to supply henceforward and alone, as the Berlin review justly remarks.

The railroad leading to tide-water from the coal regions will, of course, reap the benefit from this sudden increase of business relations, the more so as our next-door neighbors have commenced to use our ordinary coal also in large quantities for the past eight months. Canada vieing with us, and supplying them, yet a goodly portion falls to our share. It is to be presumed, therefore, that more than ever we shall be canvassing the localities whence all this coal for gas purposes is to be drawn, and unless we are able to extract it fast enough to meet the requirements, the inference is that such coal, now commanding the moderate figure of nine dollars per ton, will in the course of time attain a considerably higher value.

Apropos to this important point in the coal trade, we have the prospect of an inexhaustible supply being made at once available by the opening of the Chesapeake and Ohio Railroad. This line runs through the heart of a coal and iron field, which, in its extent, its richness, and its variety of these minerals, is probably unequalled by anything yet discovered in any part of the world. Its supply of gas coal is inexhaustible; and experiments have demonstrated that its yield of gas is equal to that of the best English coal. These deposits lie on the route of direct water communication, via the Ohio and the Mississippi, to the Gulf of Mexico, and are within a moderate distance, via the Chesapeake and Ohio road, of the Chesapeake Bay, thus having the advantage of the shortest possible routes to the West Indies and to Central and South America. It seems inevitable that this must become the great source of coal supply to countries which have hitherto drawn their gas coal almost entirely from Great Britain.

The prospect is encouraging, and not only to an important railroad enterprise, and to a hitherto neglected mineral region, but also to our mercantile marine, long in a state decadence. Our great difficulty hitherto in contending for the carrying trade of the West Indies and South America has been that vessels going thither from our ports could not find paying outward freights; but with a constant outflow of coal, and possibly, also, of manufactured iron (for the two are apt to keep close company), this difficulty would be obviated, and, with distance in our favor, there seems to be no reason why we should not, under the changed conditions which seem to be in process of evolution, control within a few years this very important branch of the ocean carrying trade. Thus the causes are already beginning to work, which must erelong transfer the commerce of the Antilles and of Central and South America from Europe to the United States.—*New York Bulletin.*

Gas-Stoves, and Water Items, from the International Exhibition.

[Condensed from the *Journal of the Society of Arts.*]

Messrs. Wright and Company, of Birmingham, exhibit an interesting series of gas burning apparatus (4,892 A), contrived by Mr. S. Wallace, applied to heating purposes; the foundation idea in the whole of which is an improved form of Bunsen burner. This burner consists essentially of a brass tube, throwing a jet of gas into a hemispherical chamber, into which air is drawn as well as gas by the expedient of leaving an opening, or break of continuity, in the gas-tube, ensheathed only by a covering of permeable safety-lamp wire gauze, just before it enters the hemispherical chamber. Upon the well-known principle that jets of fluid, escaping under pressure from an orifice, travel on in their original direction of motion a certain distance before they disperse, the gas leaps across the open chasm, and enters the hemispherical chamber, dragging in with it a current of air through the wire gauze sheath. The air and gas mix in the chamber, and then rise through a transverse internal diaphragm of wire gauze, to issue from a burner at the top. The flame produced under this arrangement is an emerald, amber-tipped cone, of very remarkable heating-power. It gives a temperature of 3,000° Fahrenheit, and readily melts brass, silver, gold, and copper. The burner is made with 1, 4, 12, 16, or 24 flames according to the uses to which it is to be applied. In one form exhibited, a furnace of 30 burners affords heat enough for generating steam in a horse and a half power steam-boiler. Mr. Wallace shows in connection with this burner a very ingenious method of making a gas-stove regulate its own heating power. An air-chamber

of thin metal, when closed by an appropriate valve, under the air expansion caused by further increase of heat in the room, drives a column of mercury up a horse-shoe shaped tube, until it closes an inverted bell-mouth, through which gas has been previously passing to supply the burners of the stove, when the gas-flames are extinguished, excepting one small flame which is fed by an independent gas supply, and therefore endures. When the gas-flames are extinguished, the room begins to cool, the air in the air-chamber contracts, the mercury contracts, the mercury falls back, the gas once more flows through the bell-mouth to the burners, and the flames in the gas-stove are relit from the one left burning for the purpose. The apparatus is so sensitive that the gas flames in the stove may be extinguished by grasping the air-chamber with a warm hand. In the steam boiler furnace the boiler-tubes are longer, and the gas thrown into the mixing chamber from 12 curved pipes, getting their gas supply through open orifices around the bottom of the chamber without a wire gauze protection. The burning gas acts upon the water in the boiler through a series of tubes, the heated air and products of combustion being conveyed to the top of the apparatus, and then through an outer jacket to an escape below. One purpose to which this steam-boiler is applied in laboratory work is shown in a piece of apparatus which enables it to maintain a hot-blast blowpipe. The steam is thrown into the spiral tube of a condenser, dragging in with it a current of gas. The steam and gas go on together to a reservoir below, where the condensed water collects at the bottom, and the gas is driven out by the pressure established by the still incident steam, to be burned in a blow-pipe, which gives more or less air upon turning a cock armed with an eccentric plate, so that either an oxidizing or reducing flame may be maintained. The apparatus has also a very ingenious regulator attached to it, by means of which the gas is shut off whenever increase of steam pressure in the boiler drives water more strongly upon a flexible india-rubber diaphragm, and in so doing lifts a plunger, or bolt, up into the gas way, so as to intercept the stream. A spiral spring attached to the diaphragm allows an adjustment of the regulator to its work. The twelve-flame furnace is adapted by Mr. Wallace to a very convenient form of portable vapor-bath.

Mr. T. Fletcher, of Warrington, also shows a gas-furnace (4,831) for the production of high temperatures. A mixture of air and gas is consumed in a series of 55 burners, placed under a conical chimney. The intensity of the heat produced is proportional to the height of the chimney placed over the burners. A colorless cone of flame, two inches high, acts upon suitable fire-clay vessels, and with chimneys varying from two to eight feet, melts gold, silver, or cast-iron, or gives white incandescence with silicious substances, in periods varying from 10 to 35 minutes. Mr. Fletcher has also a hot-blast blow-pipe, in which the air is blown by the mouth through a coiled tube that passes over three gas-flames, and issues from a blow-pipe at the proper point of a 4th flame.

Messrs. Fearnley & Son, of West Brompton, show in one of the engine-houses, in full operation their domestic gas-making apparatus (4,830), which consists of an iron retort fixed over an ordinary kitchen-range, so that the gas is distilled while the usual processes of cooking are in operation. The retort holds 40 lbs. of coal, a charge which is exhausted in an hour and a half, yields 160 cubic feet of gas. The coke is then drawn and used for supporting the fire, and a fresh charge of coal is supplied to the retort. The gas issues from the top of the retort to the worm of a condenser, and through it to a petroleum chamber, and then passes on to a purifier, consisting of four perforated floors charged alternately with layers of lime and sawdust, and having found its way through these is conveyed to a reservoir of the usual construction in the outer air capable of holding 250 cubic feet of gas. One ton of coals gives 9,000 cubic feet of gas. A second form of the apparatus is intended to be fixed independently in some out building for the generation of gas alone, and is calculated to supply it for domestic use at a cost of 2s. 2d. per 1,000 cubic feet. The price of the two forms of apparatus is respectively eighty and fifty guineas.

Mr. A Common, of South-bank, Regent's park, supplies some ingenious apparatus for protecting water-pipes from injury by frost (4,821), in which the essential part is a closed hemispherical vessel of thin copper, filled with water, which changes its form and protrudes its flat bottom when the contained water freezes. In one piece of apparatus the protrusion presses in a steel spring and sets free a catch, so that a heavily-weighted arm falls, and in doing so turns off the cock at the water main and opens a waste from the service pipes of the house. In another contrivance a pipe passes from the frost vessel, left in the outer air, through the wall to the lower part of the service-pipes of the house, and when the flat bottom of the vessel is protruded by frost it pushes a plunger through the pipe, and thrusts a closely-fitting valve off a shoulder, so that a drip is established from the house service-pipes through a waste opening. When the frost ceases the plunger is drawn back by the tension of a spring, and the drip is stopped. A third form of the apparatus in principle resembles the first but is intended to be fixed upon the supply outlet of a cistern, so that on the occurrence of frost the falling of the loaded arm closes the cock, and prevents any water from passing to the service-pipes, unless the lever is drawn up by a cord. If the frost is still present the cock is again closed as soon as the cord is again loosened, but if the frost is gone the catch comes once more into play, the arm of the lever is detained, and the cock left open.

Several different patents and methods for rendering stone and brick structures repellent of water are exhibited. All of them are colorless enamels rather than paints, and do not affect the color of the material. Mr. J. Spiller's process (4,883) is the application of superphosphate, or arsenio-phosphate of lime. Limestone by this preparation is coated with a kind of bone earth. The cost of the solution is about 5s. the gallon, covering something like 300 square feet of surface. Mr. Dent uses a solution of oxalate of lime (4,826), but he also has a very excellent preparation of paraffine, dissolved in coal-tar naphtha, well suited for dressing too porous bricks. This solution costs 4s. 6d. the gallon.

Mr. M. Neil Greig, of West Brompton, exhibits a very excellent drain trap (4,836), that deserves to be extensively known. It is made of stout glazed earthenware, and so planned that a capacious and well-formed waste-chamber receives sewage refuse, and waste water, by separate channels, and that the air-space of the trap can be kept free of sewer gas by a special ventilation. One of the practical excellencies of the trap is a distinct man-hole, by which its interior is always readily accessible in case of accidental stoppage. A small and simple form of trap is intended to replace the common bell-trap for sinks, yards and areas.

Messrs. Posser and Russell, of Dorset-street, have a reversible fire-grate of very good construction, in which coals can be placed upon a live fire, and the grate be then turned over for the fire to be brought to the top, so that the fuel may be burned from the top downwards, upon Dr. Arnott's principle, for securing slow and steady combustion.

Prof. Gustav Bischof, of Glasgow, illustrates a plan he has devised for filtering water through spongy iron and pounded limestone (4,811). The iron is placed in the upper moveable chamber of an earthenware filter, and powdered limestone is arranged in a separate layer below. The iron is procured in a powdered spongy state by the reduction of an ore without fusion, after the extraction of sulphur and copper by heat. It removes all albumenoid and nitrogenised compounds, and also lead contaminations, from the water; and a trace of iron taken up by the water is separated by its subsequent passage through the limestone. One charge of the material, costing one shilling, secures efficient filtering for ten gallons of water per day during 200 days.

Waterproof Wire-work.—One of those very simple inventions which any one might have made, but which nobody did till M. d'Argy thought of it consists simply in filling up the meshes of wire-work, of any metal or fineness, with an elastic varnish made of gums, oils, or other substances, which shall be merely impermeable or impermeable and transparent. We can imagine hundreds of applications for such a simple invention.—*Iron*,

New Electric Light.*

It will be in the recollection of the readers of the *Journal*, that in April last, an analogy was pointed out between the sunlight and the electric light, and that certain conditions were therein indicated as being most favorable to that particular development of light which would best bring out the separation of the power producing the light from the place of its manifestation. Those conditions were the employment of magneto-electricity, and the use of a closed incandescent conductor in an atmosphere which would not oxidise or otherwise affect the durability of the light-giving material. From the quotation from the Russian paper *Golos* which follows, it will be seen that the results anticipated are even now in the course of realization, and all that practical men can do is to wish the plan the success it seems to deserve, and to wait the result of the further exhibitions of its power in London and other places more accessible to the Western nations than St. Petersburgh:

"On Tuesday, the 8-20 of May, a most interesting trial was made for the first time in public at the Admiralty House, St. Petersburgh, under the aaspices of Messrs. S. A. Kosloff & Co., the proprietors of the patent, of a new system of lighting by electricity, the invention of Mr. A. Ladiguin of that town.

"Owing to the restricted space in the hall made use of on this occasion, the number of spectators was necessarily limited, but still they consisted of more than a hundred specialists from different countries, representatives of science, honorable visitors, and many reporters, who were all deeply interested, and unanimously decided that the trial was really successful.

"Up to the present time, as is well-known, the electric light has been used only for light-houses, as an electric sun illumination for signals, or on the stage where a strong light may be required, without regard to cost; but thus far it has been quite impossible to employ it for lighting streets or houses.

"By the old method the electric spark was passed between two points of charcoal, each attached to a copper wire connected with an electro-magnetic machine.

"The disadvantages attending this mode consisted in the facts, that for each light a separate machine was required, and that the light so obtained, although very powerful, was impossible to be regulated, besides being non-continuous, owing to the rapid consumption of charcoal points from exposure to the air.

"All these difficulties Mr. A. Ladiguin has tried, and apparently overcome most successfully.

"By this newly invented method, only one piece of charcoal or other bad conductor is required, which being attached to a wire connected with an electro-magnetic machine is placed in a glass tube, from which the air is exhausted, and replaced by a gas which will not at a high temperature combine chemically with charcoal. This tube is then hermetically sealed, and the machine being set in motion by means of a small steam-engine, the charcoal becomes gradually and equally heated, and emits a soft, steady and continuous light, which, by a most simple contrivance can be strengthened or weakened at the option of those employing it; its duration being dependent solely on the electric current, which, of course, will last as long as the machine is kept in motion.

"Taking into consideration the fact that one machine, worked by a small three horse power engine, is capable of lighting many hundreds of lanterns, it is evident what an enormous advantage and profit could be gained by the illumination of streets, private houses, public buildings, and mines with the new electric light. In the latter it must prove invaluable, as no explosion need ever be feared from it, and these lanterns will burn equally as well under water as in a room.

"Without mentioning the many advantages this mode of illumination has over gas, which by its unpleasant odor and evaporation is slowly poisoning thousands of human beings, and from which explo-

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sions are frequent, we can state that, by calculations made, this electric light can be produced at a fifth of the cost of coal-gas.

"We hope shortly to place before the public more complete particulars, as well as reports of further experiments which are proposed to take place in Vienna, Paris, and London."—See the Russian paper *Golos*, No. 129, of May 11-23, 1873.

"Pass the Rosy."

Dr. A. W. Miller, in the *American Journal of Pharmacy*, lets us into the secrets of the fictitious manufacture of various seductive beverages in the United States. The "German Cherry Juice" is made from black cherries, cultivated for the purpose, principally about Magdeburg. Fifteen hundred casks per annum are entered at the New York Custom House.

Cherry Brandy.

German Cherry Juice	15 gallons.
Pure Rectified Spirits	20 gallons.
Simple Syrup	5 gallons.
Oil of Bitter Almonds	1 drachm.

Rectified spirit is understood to be whiskey, which has been thoroughly deodorized by percolating through charcoal, and which is of first proof, equal fifty per cent. alcohol.

Blackberry Brandy.

German Cherry Juice	3 gallons.
Pure Rectified Spirits	25 "
Simple Spirits	5 "
Clear Water	5 "
Oil of Cinnamon	1 drachm.
Oil of Cloves	1 "

The oils are to be first dissolved in about a pint of alcohol, or high wines, and then to be mixed with the spirits before the addition of the other ingredients.

Imitation of Port Wine.

German Cherry Juice	15 gallons.
Pure Rectified Spirits	10 "
Clear Water	10 "
Simple Syrup	4 "
Tincture of Rhatany	1 pint.
Port Wine Ether	2 ounces.

It is claimed that fictitious port wine is not at present manufactured in this country, as the same thing can be done abroad at a much lower figure. It is stated that ordinary port wine, which is not by any means the pure juice of the grape, can be imported for somewhat less than 70 cents per gallon. Under these circumstances, it is, of course, in the interest of liquor merchants to sell wines "strictly pure as imported" or "in bond," rather than to trouble themselves unnecessarily in compounding them here.

The Coal Question in a Nutshell.

In a former communication I showed that cheap coal in this city must be anthracite, owing to its proximity to this market, and no other coal under $5.40, and then from Richmond, Va.

Since the writing of that article I have visited Richmond, and find that, calculating from the minimum scale of prices, coal can be laid in New York from that basin, and give a low margin of profit at $5 per ton. This cheap transportation is due to canal and ocean thoroughfares.

Leaving anthracite and bituminous coal, let us look a moment at cannel and similar coals.

The nearest locality of these coals is in Elk county, Pa., mostly on Bennett's Branch of the Susquehanna River. A section of the Toby Basin shows two seams of cannel and one of splint coal. They lie within a radius of 300 miles from this city. These varieties of coal can be put upon this market at $6.80 per ton. Enlarging our radius 50 miles more, and then we bring in the cannels of Western Pennsylvania and Eastern Ohio, such as Sterling. But owing to the zigzag method of getting to market, this coal cannot reach this city under about $10 per ton.

Increasing our radius 50 miles further, and then we bring in similar coals of West Virginia, in the valley of the Kanawha River. The nearest of these coals is at Cannelton, at the mouth of the Elk River, distant from Richmond 342 miles. Here again comes in the cheap ocean transit, for these coals can be laid in our yards at a cost of $9.63 per ton, as against English cannel at $20 per ton.

Such being the case, we see four and six long trains of these coals passing eastward, over the Chesapeake and Ohio Railroad, almost every day in the week.

I see no quotation of these coals in *The Coal and Iron Record*, and know not what they sell for from the yards. But it seems those families who desire a cheerful and bright-burning coal at low prices, can be supplied from these sources. Good orrel, gas, and coking coals can come from the same source.

As a natural and inevitable conclusion, from the rapid survey I have made of the coal question, it follows that coal in the city or vicinity of New York can never be controlled by any one corporation; never be monopolized; never attain to "starvation prices" for any length of time. Hence New York may or must become the centre of manufacturing and iron-producing industries, as it now is the centre of distribution.—R. P. Stevens, *in Coal and Iron Record*.

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THURSDAY, OCTOBER 16, 1873.

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TRUE PROGRESS.

OUR NEW NATIONAL ASSOCIATION.

"Brag is a good dog, but Hold-fast is a better." This is but a less elegant way of putting the proposition Experience is better than Enthusiasm. Some have put into the fallacious form "Experience is better than Science;" fallacious and very mischievous, for *true* Science, as distinguished from "Science falsely so-called" is nothing but all human experience put on record, condensed, and reduced to order, or into the shape of manageable rules and formulæ.

Now, as to this matter of enthusiasm and experience, an extraordinary phenomenon we venture to say, is presented by one large and influential class of men in these United States; a phenomenon which would be regarded abroad as incredible, by those who have not mingled with and observed this class of men.

In the midst of the hurry-scurry, helter-skelter, heels-over-head, hap-hazard, rule-or-ruin progress of almost everything in this country, which has a tendency to reduce all kinds of business to mere matter of blind speculation, next door to actual gambling (from the effect of which the nation is even now sick and suffering), the class of men we refer to, having charge of one of the most enormous interests of the country, are preeminent in being, as a class, conservative, reliant on experience alone, and devoid of enthusiasm *to a fault*. Need we add that we refer to the American Gas Fraternity?

There are reasons for this phenomenon, as well as for all others. The Managers of Gas Works, in this country as in all other countries, have greater burdens, and more far-reaching responsibilities, to undergo than in almost any other technical pursuit. They are held responsible on the one hand to the proprietors of Gas Works, who look to them to realize for them profits on their investments, and on the other hand to the whole community, who generally look to them to furnish an unlimited quantity and super-eminent quality of gas, to be used, or wasted at its own sweet will, and at a ruinously low price. Hence conscientious men in these positions are hard to move from their beaten track, for fear of "going farther and faring worse."

There is, moreover, another highly important condition that prevails, especially in this country, and has very much to do with this eminent habit of conservatism. This is the *isolation* in which the American Gas Manager, as a rule, spends his time. Even when travelling, which he can seldom or never do, except on professional business, the absorption of his time and thoughts, by such business, almost debars him from the opportunity for any social or professional communion, certainly from any of that intimate association and intercourse which leads to mutual support and encouragement, by the intercommunication and comparison of results and experiences.

Our new National Association, which will be holding its first annual session, at the time this issue goes from the Press, will supply one of the needs of the Nation, as well as of the American gas fraternity, by eliciting in council, before the whole profession, the experience of all, as well as all new facts and suggestions, that may promise to be of interest, and giving to all equal opportunities to join in discussion, and to receive and communicate new ideas. Thus, in any case of hesitation regarding any point of science or practice, the counsels and experience of the wiser brethren may be sought for and obtained, confidence gained, and the burden of responsibility in a measure thrown off.

The purely moral influence of the Association is not to be despised. Men will no longer stand alone and unsupported. The maintenance of their influence over the communities which they serve will necessarily be much easier and less burdensome to themselves individually, when it is merged more or less into that of a National Organization for mutual encouragement and advice.

Other objects, of a more material and positive kind, will be accomplished by the Association, which could not be brought about in any other conceivable way. These are set forth briefly in the 3rd Article of the Constitution. It is proposed by the promoters of the movement that the collections which will be rapidly accumulated, of information of all kinds, of value to the profession, shall be arranged at some central and accessible point, which will be a headquarters or place of *rendezvous* for the members of the Association, a central focus of information, where all the literature of gas, of all countries, and all information attainable, of every kind that is likely to be useful to the profession, will be found gathered together, including, for example, all patented inventions; all laws relating to gas, of all countries; all rules and regulations of gas-companies; plans of gas-works and distribution systems in cities; and a multitude of other matters of information, which, it is purposed shall be so systematically arranged and classified as to be easy of reference and consultation.

The public may also be assured that the facilities thus afforded to the fraternity for information on all subjects connected with gas, will result in the most important benefits to consumers, in many cases.

Much more we might add, but probably it might be premature to do so, in advance of the pending meeting, at which the organization of the Association is to be completed and perfected in many points left unsettled at the preliminary meeting of April last. Some little discontent seems to have arisen in certain quarters, on account of the adoption of the fundamental principle that only companies or parties actually engaged in manufacturing gas, shall form the constituents of the Association, rather than professional experts individually, or those claiming to be such. All we can say at present, was that such was the almost unanimous will of the gentlemen who attended the meeting of April. Whether any modification of this will be put in shape and adopted, at the larger gathering which is now to occur, it is impossible for us to say, and it would be obviously altogether unbecoming for us individually, considering our official relations to the Association, to make any individual suggestion on this head.

PROGNOSTICATION.

In days past we have tried to call the attention of the public mind to the wells of gas (marsh-gas of old) which may be opened to the hand of man at so many points on this continent, as the labor of geologists has indicated. Little heed has been given. That is, no "sensation" has been created. The public is naturally more occupied with things of the day. The Mosaic days it does not care for. Hence geological subjects must subside for the present. Accomplished facts, however, must be accepted. One of the most extraordinary of these is that which no intellect can longer resist, that the liquid hydrocarbons to be obtained from the solid earth in

certain localities are *quite as reliable* in quantity as the solid hydrocarbons. Wonderful it is to think of. This is no enthusiasm, but solid fact; as shown by the money-statistics. Let us think of it. It must be borne in mind by the Gas-Profession. It even gives countenance to the scheme that has been suggested (hypothetically) by ourselves, and which it seems is even seriously by others, of conducting our already suggested Petrolioducts to our large cities, as aqueducts are now conducted.

[SPECIAL EDITORIAL NOTE.]

[The following important paragraph, which was included in the leading editorial, in the last issue, addressed "To the Gas Fraternity," was accidentally omitted in setting up.—ED.]

Doubtless very many others besides will send delegates and give in their adhesion at the meeting itself.

[Let us interpolate here that there is nothing in the Constitution to prevent *any person whatever* from attending as a delegate, from *any Company* whatever in the United States; provided that proper *credentials* are obtained from the President or other authorized official of the said Company. Three delegates are admitted from each Company.]

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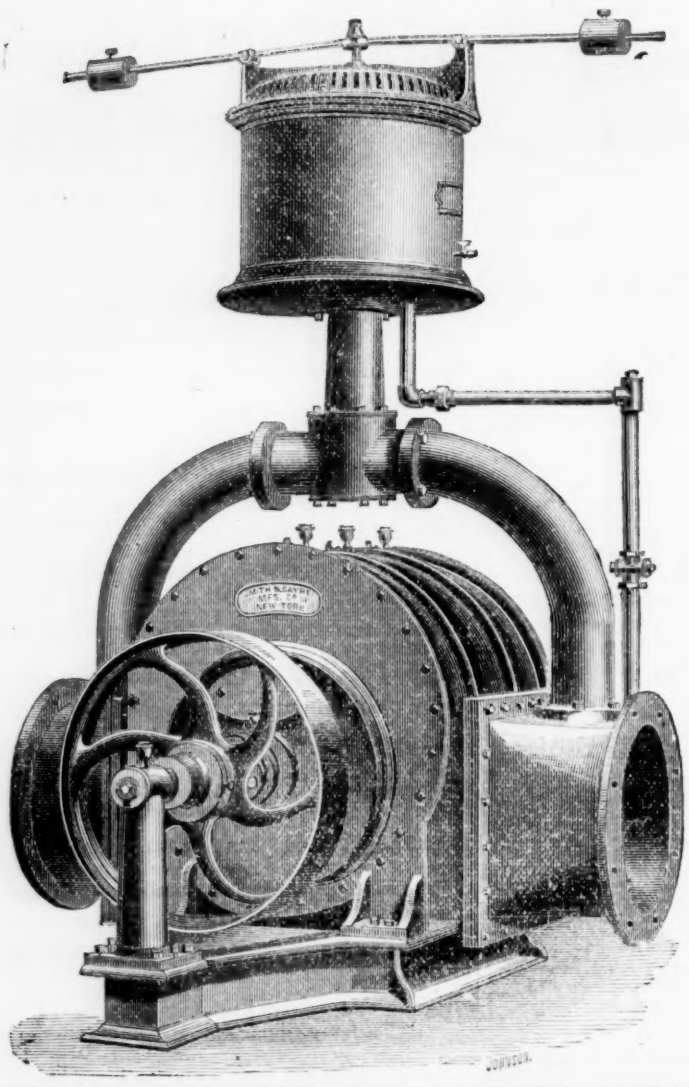

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DORCHESTER, March 3. 1870.

Mr. E. DUFFEE.

Dear Sir: We have had your Gas Trays in constant use for almost one year and six months and find them superior to any others we have ever used, both in point of economy and efficiency. Truly yours, W. B. BROOKS,
Agent Dorchester Gas-Light Co.

JAMAICA PLAINS, MASS., June 21, 1871.

EDWARD DUFFEE, ESQ.

Dear Sir; The Trays ordered by this company three years ago, are getting somewhat worn. I wish to say here that I consider your Trays to be superior to any yet invented, therefore please make us another set at the price named, to be like the sample shown in every way, and oblige Yours truly
JAMES F. ROGERS,
Sup't Jamaica Plains Gas-Light Co.

BROOKLINE, June 11, 1871.

E. DUFFEE, ESQ.

Dear Sir: You will please make a set of Gas Trays for this company as soon as convenient, at price named. In regard to the merits of the Tray, after having them in constant use for over two years, I will say that I consider them *superior to any Tray* manufactured in this country. Respectfully yours,
H. A. ALLYN,
Sup't Brookline Gas-Light Co.

BANGOR, August 2, 1870.

EDWARD DUFFEE, ESQ.

Dear Sir: Yours of the 20th ult. is received. In regard to your Gas Trays, I take pleasure in saying that they have been in use over two years, and have given perfect satisfaction and they are in good order at the present time; should have no hesitation in recommending them, believing they are the most durable and easiest kept in order of any with which I am acquainted. Respectfully yours,
W. H. PERRY, Sup't.

OFFICE OF THE SPRINGFIELD GAS-LIGHT CO.'
SPRINGFIELD, MASS., Oct. 10, 1871.

Mr. WARD,
President Hartford Gas-Light Co.

Dear Sir: I have been using Gas Screens made by the American Gas Screen Company, for nearly a year, and find them superior in every way to the wooden Screens made and formerly used by the Springfield Gas-Light Co. I can purify more gas with the same quantity of lime, there being more surface to the Screens; and I consider them more durable, and recommend them to your consideration.

Yours with great respect,
GEORGE DWIGHT.

ROXBURY, June 14, 1872.

EDW. DUFFEE, ESQ.

Dear Sir: In answer to your inquiry regarding your Patent Gas Screens, I am happy to be able to say, that after nearly three years constant use we are perfectly satisfied with them being able to purify over fifty pet cent. more gas with them, than with any other Screen we have used.

Yours respectfully,
THOMAS J. PIERCE

OFFICE DETROIT GAS-LIGHT CO.,
DETROIT, MICH., April 22, 1872.

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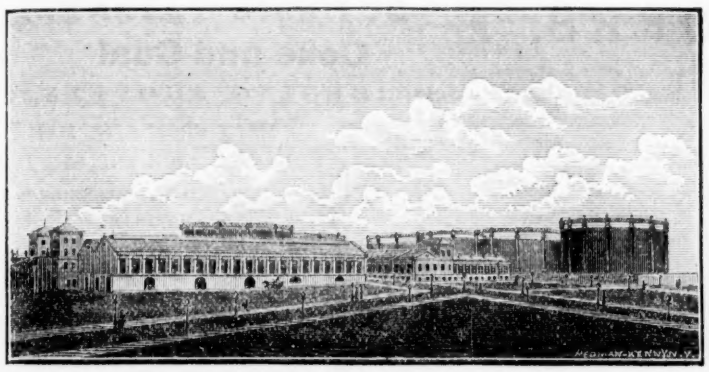
REFERENCE.—RICHARD MERRIFIELD, Esq., late Vice President MANHATTAN GAS-LIGHT COMPANY.



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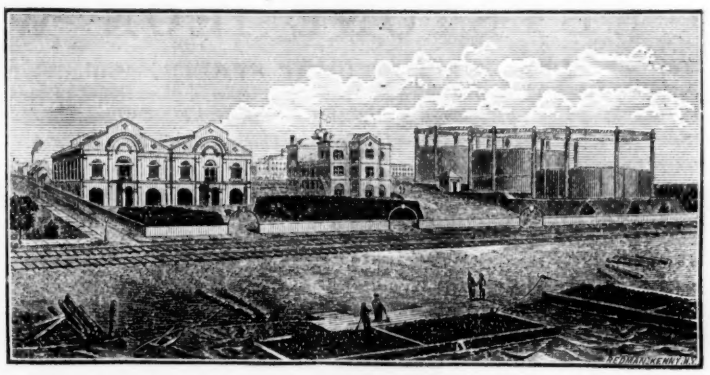

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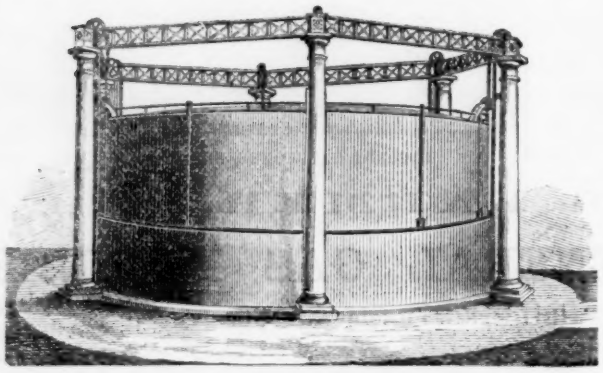

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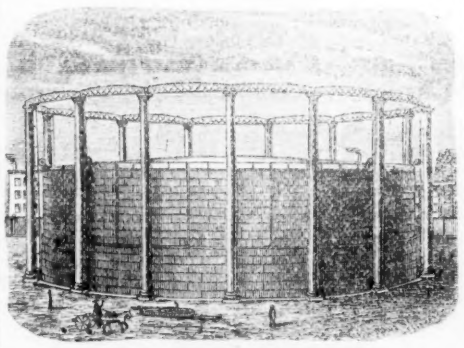

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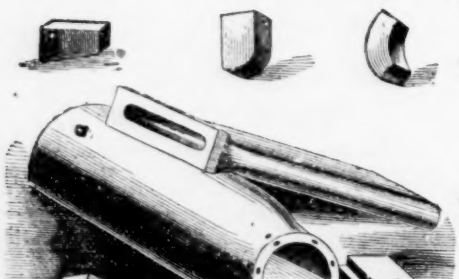

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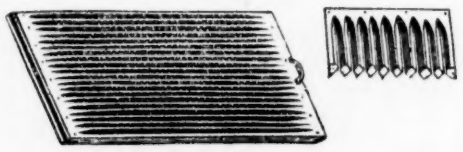

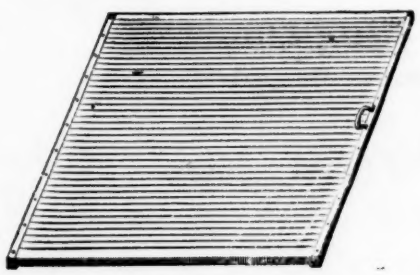

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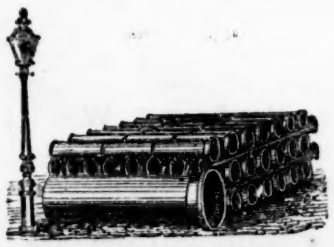

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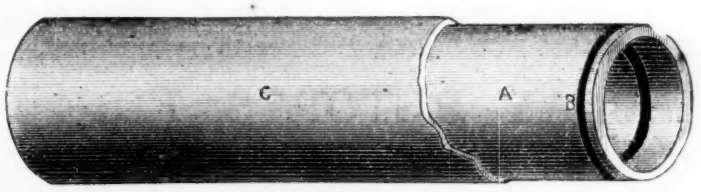

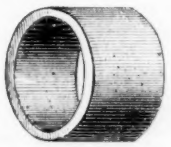

FIG. 2.

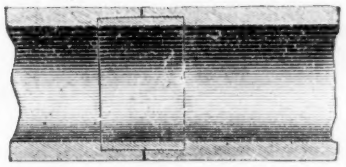

FIG. 3.

A—Cylinder of Wood. B—Band of Iron. C—Coating of Hydraulic or Asphaltum Cement.

FIG. 2.—Thimble for Connection. FIG. 3—Horizontal Section and Connection.

Above is a cut of the

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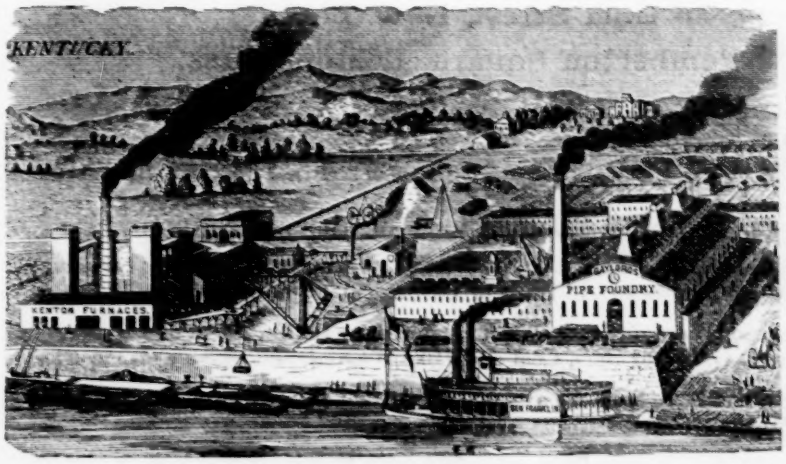

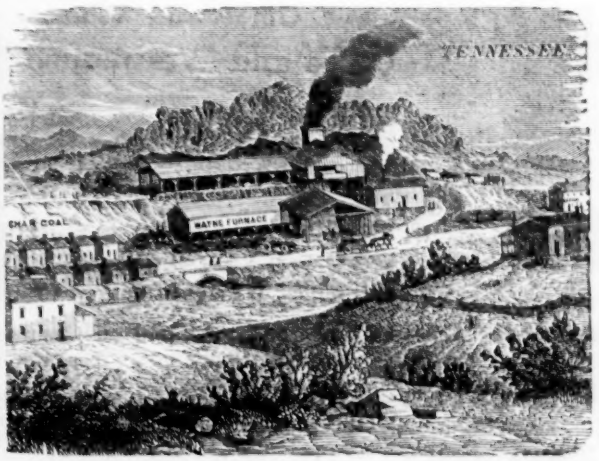

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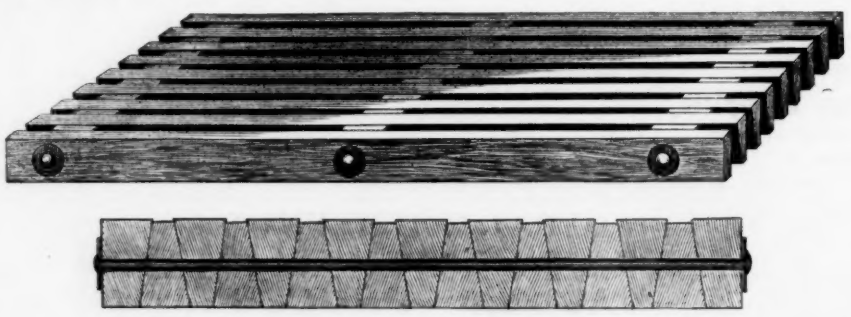

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